REMARKS

I. Support for the Amendments to the Claims

Claims 1-15, 17-18, 20-35 and 66 are currently in the application. Claims 1, 17-18, and 20 have been amended, and claims 16 and 19 have been canceled without prejudice. The amendments to claims 1, 17-18, and 20 are made without prejudice to pursuit of the previous claims in an appropriate divisional or continuation application. Claims 16 and 19 are canceled without prejudice to their pursuit in an appropriate divisional or continuation application.

Support for the amendments to claims 1, 17-18, and 20 can be found throughout the specification and claims as originally filed. No new matter has been added by the amendments to the claims.

Additional support for the amendments to claims 1, 17-18, and 20 can be found in the language of original claims 1, 16-20, 35, and 66 and in the specification, e.g., from page 16, line 1, to page 18, line 3; from page 18, line 5, to page 20, line 2; on page 20, line 27; from page 28, line 33, to page 30, line 8; on page 32, lines 5-6 and 19-21; on page 35, lines 22-24; on page 37, lines 10-12; on page 38, lines 7-11; on page 39, lines 12-14; on page 40, lines 8-10; from page 40, line 1, to page 41, line 3; and in the Examples.

II. Status of the Claims

Claims 1-15, 17-18, 20-35 and 66 are currently in the application. Claims 1, 17-18, and 20 have been amended, and claims 16 and 19 have been canceled without prejudice. The amendments to claims 1, 17-18, and 20 are made without prejudice to pursuit of the previous claims in an appropriate divisional or continuation application. Claims 16 and 19 are canceled without prejudice to their pursuit in an appropriate divisional or continuation application.

III. The Office Action

Applicants thank the Examiner for issuing the Office Action on February 6, 2009, and for the Examiner's having vacated the Office Action mailed December 24, 2008.

IV. The Rejection of Claims 1-12, 14-35, and 66 under 35 U.S.C. §103(a) over Mitchell in view of Burgoyne is Traversed, but Rendered Moot in Part

The Examiner has maintained the rejection of claims 1-12, 14-35, and 66 under 35 U.S.C. 103(a) as unpatentable over Mitchell (WO 00/21973; issued April 20, 2000) in view of Burgoyne (U.S. Patent 5,496,562; issued March 5, 1996). Applicants again traverse the rejection and respectfully request reconsideration of these claims.

Claims 16 and 19 have been canceled without prejudice, and thus, the rejection is rendered moot with respect to these claims.

The Patent Office alleges, in pertinent part:

> Mitchell et al. disclose the method steps (a)-(e) as recited in instant claim 1 (See pg. 2, third paragraph) and the method steps as recited in claim 4 (See pg. 2, third paragraph). The nucleic aid is retained by the filter substantially in the absence of ionic interaction (See column 2, last paragraph), and by physically retarding the movement of the nucleic acid down the filter (See pg. 3, first paragraph). The nucleic acid is heated to an elevated temperature, whilst retained by the filter prior to elution and the temperature is about 90°C, (See pg. 3, second paragraph, pg. 6, first paragraph, pg. 12, first paragraph and pg. 25, experiment 6). There is a solution for rupturing intact whole cells to leave condensed nuclear material and a lysis solution for lysing nuclear material (See pg. 3, third paragraph). The sample comprises whole blood, which has been treated with a red blood cell lysis solution, whilst the white cells containing the nucleic acid are retained by the filter as a retentate (See pg. 6, third paragraph). The red blood cell lysis solution is listed in Table 2 (see pg. 17). The lysis solution includes a

week base (Tris), a chelating agent (EDTA) (see pg. 17). A filter material is selected which provides no barrier to cells, but enables the cells to be retained by the filter as a retentate (See pg. 6, second paragraph). Sodium dodecyl sulfate is one of the detergents used with a concentration of 5% (see pg. 8, line 9). The pore size of the filter is 4.5 um (See pg. 11, table 1). The filter used in the method comprises a plurality of fibers and has a substantially disordered structure, the fiber diameters are selected from the range of 1 um to 10 um (See pg. 9, fourth paragraph). The fiber is a glass fiber, silica based or plastic based fiber (See pg. 10, first paragraph). It is possible to isolate nucleic acid in the absence of a chaotrope (See pg. 10, second paragraph). Genomic DNA is a desired target or nucleic acid is RNA (See pg. 15, fourth paragraph).

Mitchell et al. also indicate that if the filter is allowed to dry the nucleic acid still is recoverable, but ***may be sheared*** and the ***yield will be reduced.*** Where the method is carried out in a column, ***drying of the filter may be avoided*** by using a water vapour retarding or blocking seal (see pg. 7, lines 15-19).

Mitchell et al. do not disclose the method steps (f)-(g) as recited in instant claim 1 and that uric acid or a urate salt is used.

Burgoyne discloses that the blood-stained paper was dried, and sent through the ordinary mail so that it spent at least three days in the mail, and had the DNA extracted from it (See column 4, lines 41-45). A card loaded with a DNA sample is air dried at room temperature (See column 5, lines 43-44). A solid matrix comprises an absorbent cellulose based paper (such as filter paper) or a micromesh of synthetic plastic material (see column 2, lines 21-26).

Burgoyne also discloses the use of uric acid as a DNA protecting compound together with a weak base (see pg. 2, lines 53-58).

Mitchell et al. do not explicitly disclose the period of storing nucleic acid as recited in claims 6-9.

Burgoyne discloses that the blood-stained paper treated with detergent is stored for more than 36 months without DNA degradation (See column 4, lines 21-25).

One of ordinary skill in the art would have been motivated to apply the method steps of drying a solid phase medium with a cell lysate comprising nucleic acid and storing the dried solid phase medium with the nucleic acid as taught by Burgoyne because it would have been useful for long term storage, such as 36 months (See column 4, lines 21-25) or four years (See column 5, lines 1-4). It would have been prima facie obvious to apply the method steps (f)-(g) as recited in instant claim 1. [Pp. 3-5; underline in original; all other emphasis added.]

And also:

> Regarding claims 35 and 66, Mitchell et al. ***do not explicitly disclose adding a single solution to solid phase medium*** having a cellular retentate and the single solution simultaneously comprising; a weak base, a chelating agent and an anionic surfactant or detergent.
>
> Burgoyne discloses ***a solid matrix*** for storage of blood DNA ***having a composition absorbed*** and that the composition comprises a weak base, a chelating agent and an anionic surfactant or detergent (see column 2, lines 59-64, column 3, and lines 18-26).
>
> Therefore, one of ordinary skill in the art would have been motivated to add a single solution comprising a weak base, a chelating agent and an anionic surfactant or detergent to a solid medium having the cellular retentate as taught by Burgoyne because by doing so blood DNA can be stored for a long time and the DNA is extracted from a solid medium. It would have been prima facie obvious to apply a single solution simultaneously comprising; a week base, a chelating agent and an anionic surfactant or detergent to a solid phase medium having a cellular retentate. [P. 5; underline in original; all other emphasis added.]

Applicants respectfully disagree for the reasons already on record. Essentially, the Patent Office alleges that Mitchell discloses steps (a)-(e), but not (f)-(g) (i.e., drying and storing the nucleic acid on the solid phase medium). The Patent Office alleges that Burgoyne discloses drying DNA samples on a card and storing them. Claims 1-12, 14-15, 17-18, and 20-34 depend, either directly or indirectly, on underlying claim 1.

As noted previously, in the present invention, the improvement is more than the predictable use of prior art elements according to their established functions.

Applicants have already responded to this rejection at length for the reasons already on record and respectfully refer the Examiner to the previous rebuttals and more particularly to pages 10-16 of the Amendment dated May 30, 2008.

In addition to the foregoing, however, Applicants wish to draw the Examiner's attention to the following points.

First, Mitchell is concerned with isolating nucleic acid. However, Mitchell specifically teaches that one must ***not*** let the column dry out – see page 7, lines 15 to 19. Furthermore, while Mitchell mentions the use of weak base and chelating agent (e.g., "FTA®-type" materials), this statement is made in the context of lysis of the red blood cells to get rid of them in a preliminary stage – see page 17. Mitchell does not recognize that one can, ***in one step***, carry out the lysis with a suitable detergent-containing lysis reagent ***and*** retain the lysed DNA on the column and dry it for storage.

Second, Mitchell would not have turned to Burgoyne and recognized that he could dry before elution. Burgoyne teaches the use of a dry substrate which ***already*** has the reagents in situ on the substrate to prevent any degradation ***before*** the blood spot is applied. If Mitchell had read Burgoyne, he would surely have assumed that it was impossible to dry out his column ***unless*** he had ***pre*-protected** his column material to prevent it from degrading the DNA. It is the present invention which – ***surprisingly*** – showed that one did not need to protect the column beforehand, but that one could include the necessary protecting and lysing agents all in one solution (e.g., "liquid FTA®") and ***subsequently*** apply this to the already trapped nucleic acid-containing cells. It is ***surely quite surprising*** that enough of the protecting agents will stick on the column to prevent degradation and allow one to dry out the material for elution at a later stage. It is also very practical, because one can defer the point at which one needs to isolate and test the DNA itself.

Moreover, in Mitchell, the SDS and TE are not part of the same solution, but the current claim 1 is directed to "a solution comprising (i) an anionic surfactant or detergent, (ii) a weak base, and (iii) a chelating agent." In Mitchell, the SDS and TE are added separately and filtered to waste.

Burgoyne also describes a composition comprising a weak base, a chelating agent, an anionic surfactant or anionic detergent and optionally uric acid or a urate salt. Unlike the

present invention, however, the card comprises the composition prior to its contact with the sample. In the present invention and in Mitchell, the solutions are added after the sample.

While it is true that Burgoyne discloses drying the matrix, it should be noted that Burgoyne fails to mention adding a solution to the already applied sample. Instead, the solution of Burgoyne is added to the matrix and dried prior to application of the sample.

In essence, the difference between Burgoyne and the present invention is that in Burgoyne, the chemical composition is deposited on the matrix and dried and then is contacted by cellular samples, whereas in the present invention, the solution is applied to the solid matrix after the matrix contains the samples.

Nothing in Mitchell would suggest to one of skill in the art that it should be combined with Burgoyne, or vice versa, to produce the present invention (single solution application following sample application and subsequent drying for archiving). In particular, one of skill in the art would not cite Mitchell's method for archiving since Mitchell specifically teaches away from drying, as it harms the nucleic acid and reduces yield.

Specifically, in Mitchell, ***multiple lysis solutions*** are added ***sequentially*** in order to function, and Mitchell ***teaches away from drying***, as it **shears the nucleic acid** and **reduces yield**. Burgoyne uses a chemical composition of the base, chelator, detergent and uric acid/urate salt ***that is already deposited*** on the solid matrix ***and dried prior to exposure*** to the cells.

In contrast, in the present language of claim 1, ***the sample is added to the solid phase medium first and then the single-solution archiving agent*** (a solution comprising (i) an anionic surfactant or detergent, (ii) a weak base, and (iii) a chelating agent; step d), ***followed by drying and storage***. In claims 35 and 66, ***the solution also simultaneously comprises*** a surfactant or detergent, a weak base, and a chelating agent. Therefore, the present invention is

distinguishable from both Mitchell and Burgoyne, either alone or in combination with one another.

Thus, there is no teaching, suggestion or motivation in Mitchell or Burgoyne that would have led on of ordinary skill in the art to combine and/or modify these teachings to arrive at the claimed invention, nor is the present invention merely a variation on known work in the field of endeavor that one of ordinary skill in the art would have been predictable to one of ordinary skill in the art, nor is it chosen from a finite number of identified, predictable solutions, with a reasonable expectation of success. In the present invention, therefore, the improvement is more than the predictable use of prior art elements according to their established functions.

Applicants respectfully submit that remaining claims 1-12, 14-15, 17-18, 20-35, and 66 fulfill the requirements of 35 U.S.C. §103(a), thereby placing these claims in condition for allowance, and request the Examiner's reconsideration accordingly.

V. The Rejection of Claim 13 under 35 U.S.C. §103(a) over Mitchell in view of Burgoyne and Mullis is Traversed

The Examiner has maintained the rejection of claim 13 under 35 U.S.C. 103(a) as unpatentable over Mitchell (WO 00/21973; issued April 20, 2000) in view of Burgoyne (U.S. Patent 5,496,562; issued March 5, 1996) as applied to claims 1-12, 14-35, and 66 and further in view of Mullis (U.S. Patent 5,187,083; issued February 16, 1993). Applicants again traverse the rejection and respectfully request reconsideration of this claim.

The Patent Office alleges:

> The teachings of Mitchell et al. and Burgoyne et al. are set forth in section 3 above. Mitchell et al. and Burgoyne ***do not disclose the size of the filter pore*** as recited in claim 13.
>
> Mullis discloses a method for obtaining substantially purified DNA from a biological sample (See column 3, lines 21-22). The filter includes a surface that reversibly and specifically retains DNA. The pore size is from about 0.2 microns to about 0.8 microns. A preferred filter comprises a membrane filter comprised of cellulose acetate and nitrocellulose having a pore size of 0.45 microns (See column 3, lines 44-54, column 7, line 44-45, column 10, lines 16-29, column 15, lines 25).
>
> One of ordinary skill in the art would have been motivated to apply the filter of Mullis with the pore size which is from about 0.2 microns to about 0.8 microns because the filter of Mullis is used in obtaining substantially purified DNA from a biological sample (See column 3, lines 21-22). It would have been prima facie obvious to apply the filter of Mullis with the pore size which is from about 0.2 microns to about 0.8 microns for isolating nucleic acid as claimed. [P. 6; underline in original; all other emphasis added.]

Claim 13 is dependent on claim 1, and the discussion of the rejection of claim 1 over Mitchell in view of Burgoyne also applies here.

Again, nothing in Mitchell would suggest to one of skill in the art that it should be combined with Burgoyne, or vice versa, to produce the present invention (single solution application following sample application and subsequent drying for archiving). In particular, one of skill in the art would not cite Mitchell's method for archiving since Mitchell specifically teaches away from drying, as it harms the nucleic acid and reduces yield.

Specifically, in Mitchell, ***multiple lysis solutions*** are added ***sequentially*** in order to function, and Mitchell ***teaches away from drying***, as it **shears the nucleic acid** and **reduces yield**. Burgoyne uses a chemical composition of the base, chelator, detergent and uric acid/urate salt ***that is already deposited*** on the solid matrix ***and dried prior to exposure*** to the cells.

In contrast, in the present language of claim 1, ***the sample is added to the solid phase medium first and then the single-solution archiving agent*** (a solution comprising (i) an anionic surfactant or detergent, (ii) a weak base, and (iii) a chelating agent; step d), ***followed by drying and storage***. Claim 13 is dependent on claim 1, and the limitations of claim 1 also apply to claim 13. Therefore, the present invention is distinguishable from both Mitchell and Burgoyne, either alone or in combination with one another.

Thus, there is no teaching, suggestion or motivation in Mitchell or Burgoyne that would have led on of ordinary skill in the art to combine and/or modify these teachings to arrive at the claimed invention, nor is the present invention merely a variation on known work in the field of endeavor that one of ordinary skill in the art would have been predictable to one of ordinary skill in the art, nor is it chosen from a finite number of identified, predictable solutions, with a reasonable expectation of success. In the present invention, therefore, the improvement is more than the predictable use of prior art elements according to their established functions.

Applicants traverse the rejection and respectfully submit that the teachings of Mullis fail to supply the deficiencies of Mitchell or Burgoyne, either alone or in combination.

Mullis ***produces lysate first*** and ***then traps this on a filter*** followed apparently by ***elution without any suggestion of intermediate drying***. One would certainly not have turned to Mullis for any suggestion that one could dry before elution.

Applicants respectfully submit that claim 13 fulfills the requirements of 35 U.S.C. §103(a), thereby placing these claims in condition for allowance, and request the Examiner's reconsideration accordingly.

CONCLUSION

It is believed that all the claims are in condition for allowance. If discussion of any amendment or remark made herein would advance this important case to allowance, the Examiner is invited to call the undersigned as soon as convenient.

In view of the foregoing amendments and remarks, the present application is respectfully considered in condition for allowance. An early reconsideration and notice of allowance are earnestly solicited.

Applicants hereby request a one-month extension of time for the Amendment and accompanying materials. If, however, a petition for an additional extension of time is required, then the Examiner is requested to treat this as a conditional petition for an additional extension of time and the Commissioner is hereby authorized to charge our deposit account no. 04-1105 for the appropriate fee. Although it is not believed that any additional fee (in addition to the fee concurrently submitted) is required to consider this submission, the Commissioner is hereby authorized to charge our deposit account no. 04-1105 should any fee be deemed necessary.

Respectfully submitted,

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